



Effect of Aromatherapy with Damask Rose (*Rosa damascena* Mill.) on Anxiety in the Elderly: Open-Labeled Quasi-Experimental Placebo-Controlled Trial

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Abstract

Background: Anxiety in orthopedic surgeries, especially knee replacement, is one of the most common complaints of the elderly. Aromatherapy with Damask Rose (*Rosa damascena* Mill.) can be one of the non-pharmacological methods in complementary medicine to control anxiety.

Objectives: The present study aimed to determine the effect of aromatherapy with *R. damascena* on elderly anxiety after knee replacement surgery.

Methods: In this quasi-experimental study, 80 elderly patients (60 to 90 years old) undergoing knee replacement surgery according to inclusion criteria were selected by convenience sampling method randomly from Moheb Mehr and Shafa Yahyaian hospitals of Tehran, Iran, and were divided into two groups of case and control. The case group was exposed to aromatherapy intervention at four intervals of 30 minutes. The instrument for measuring anxiety was the Visual Analogue scale for anxiety (VAS-A).

Results: The results showed that the study elderly were homogeneous in terms of demographic variables in both case and control groups, except for two variables of education level and consumption of analgesics, which were also determined by two-way ANOVA. These parameters (education level, $P = 0.54$, and consumption of analgesics, $P = 0.661$) were not confounding variables. Significant differences were observed in the anxiety of the case group before and after the intervention ($P < 0.001$), while this difference was not significant in the control group ($P = 0.304$). Moreover, the difference in anxiety scores was significantly decreased after the intervention compared to before intervention in both case and control groups ($P < 0.001$). Probably Damask Rose aroma molecules produce and secrete neurotransmitters such as endorphins and enkephalin, thereby reducing pain and anxiety.

Conclusions: According to the findings of the study, the aromatherapy with *R. damascena* seems to be effective in reducing postoperative anxiety in these elderly patients.

Keywords: Anxiety, Aromatherapy, Elderly

1. Background

Joint diseases are more prevalent with increasing age. The knee joint is one of the most involved items. Total knee replacement (TKR) surgery is performed in patients with severe functional disability and pain in this joint due to destructive arthritis (osteoarthritis, rheumatoid arthritis, and posttraumatic arthritis) or intraarticular bleeding (in patients with hemophilia) (1). Knee osteoarthritis is the most common problem in the elderly and the leading cause of motor disability, so that it has involved 80% of the population over 65 years (2).

Anxiety is one of the common preoperative prob-

lems (3). Preoperative anxiety occurs due to concerns about postoperative problems such as pain and discomfort, changes in the mental image of the body or performance, increased dependencies, and possible changes in the way of life (4). In general, preoperative anxiety is associated with "postoperative anxiety" and is the major predictor of pain in patients undergoing joint replacement. The postoperative anxiety can influence the rehabilitation and reestablishment of the client, which in turn increasingly depend on the individual's participation. The patients after surgery may be worried about their movement and physical functioning. Postoperative anxiety is associ-

ated with obtaining desirable function and emergence of pain in the elderly (5). Increasing patient anxiety may increase the difficulty in the treatment, surgery, and physical discomforts, which subsequently require high doses of the drugs to control pain and anxiety (6).

One of the non-pharmacological methods of reducing anxiety in complementary medicine is aromatherapy with the use of essential oils through the sense of smell to increase the feeling of health, healing, and reducing the symptoms of the disease. In fact, the essential oil molecules are absorbed by the nasal mucus containing the olfactory receptors. The olfactory message is transmitted through the olfactory nerve to the limbic system of the brain. Two sites of the limbic system, the amygdala, and the hippocampus, are of particular importance in perfume processing. The amygdala elicits an emotional response, and the hippocampus is involved in shaping and remembering and retrieving memories vividly. The olfactory message from aromas in the limbic system also releases neurotransmitters such as enkephalin and endorphin, causing euphoria and reducing pain and anxiety. These neurotransmitters create a sense of happiness and reduce the perception of pain and anxiety (7).

Various studies have shown that aromatherapy can be effective in reducing anxiety, depression, pain, fatigue, nausea, vomiting, and skin ulcers in some diseases. However, these effects have not been accurately confirmed. Overall, few studies have been conducted in this area in the elderly research community (8-11).

2. Objectives

The present study was conducted to determine the effect of aromatherapy with *R. damascena* on anxiety in elderly patients under knee replacement surgery with the hypothesis that “aromatherapy with *R. damascena* is effective in reducing anxiety in elderly patients under knee joint surgery”.

3. Methods

This semi-experimental clinical trial was conducted on elderly patients undergoing knee replacement surgery admitted to orthopedic surgery departments in the Moheb Mehr and Shafa Yahyaian hospitals of Tehran, Iran. The sample size was estimated at 80 (40 in the case group and 40 in the control group) at a significant level of 0.05 and test power of 80%, and assuming $d = 1.5$ for the effect of aromatherapy with *R. damascena* on the severity of anxiety to

obtain statistically significant effect of the aromatherapy program. It should be noted that the standard deviation was calculated 2.4 in a similar study by Braden et al. in 2009 (3).

The inclusion criteria were no history of asthma and allergy to *R. damascena*, no psychiatric disorders (just psychosis, dementia, and delirium), non-use of alcohol and drugs, healthy sense of smell, no history of migraine and chronic headaches. The exclusion criteria were the lack of willingness to continue cooperation in the process of clinical practice, symptoms of respiratory allergy during the study, and elderly patients who were admitted to the ICU for more than 24 hours because they may have hemodynamic problems or hemorrhage, which is an exclusion criterion.

The data collection tool was the demographic profile form that was completed by interviewing and using the patient records at the beginning of the study. The scientific validity of the demographic form was also determined by the content validity method using the personal opinions of five faculty members of the School of Nursing and Midwifery at Iran University of Medical Sciences. The final revision was made after using the comments, suggestions, and the final approval of the Research and Ethics Committee. The instrument for measuring anxiety was the Visual Analogue scale for anxiety (VAS-A), which is a 100-millimeter ruler that was used by Kindler et al. (12) in 2000 to investigate the anxiety of patients before surgery and to determine anxiety and fear of anesthesia. Facco et al. (13) in 2013 validated the VAS tool for measuring anxiety. The results suggest a high correlation between the Visual Analogue scale for anxiety and the State-Trait Anxiety inventory (STAI), which can be a good tool for measuring anxiety.

The researcher contacted by telephone numbers from each of the relevant departments in order to know the day of operation and the patient's arrival time to the department, as well as obtained the necessary information from the nurse or head nurse about the number of elderly patients undergoing knee replacement surgery, the date of surgery and the patient's arrival time to the department. The samples were collected using convenience sampling method; so the studied elderly who met inclusion criteria were subjected to one of the two control and case groups randomly according to the hospitals (Shafa Yahyaian Hospital for case group and Moheb Mehr Hospital for control group) and flipping coin (Figure 1).

The researcher, after obtaining a written informed consent from the studied elderly, completed the demographic information form through the records and interview. Be-

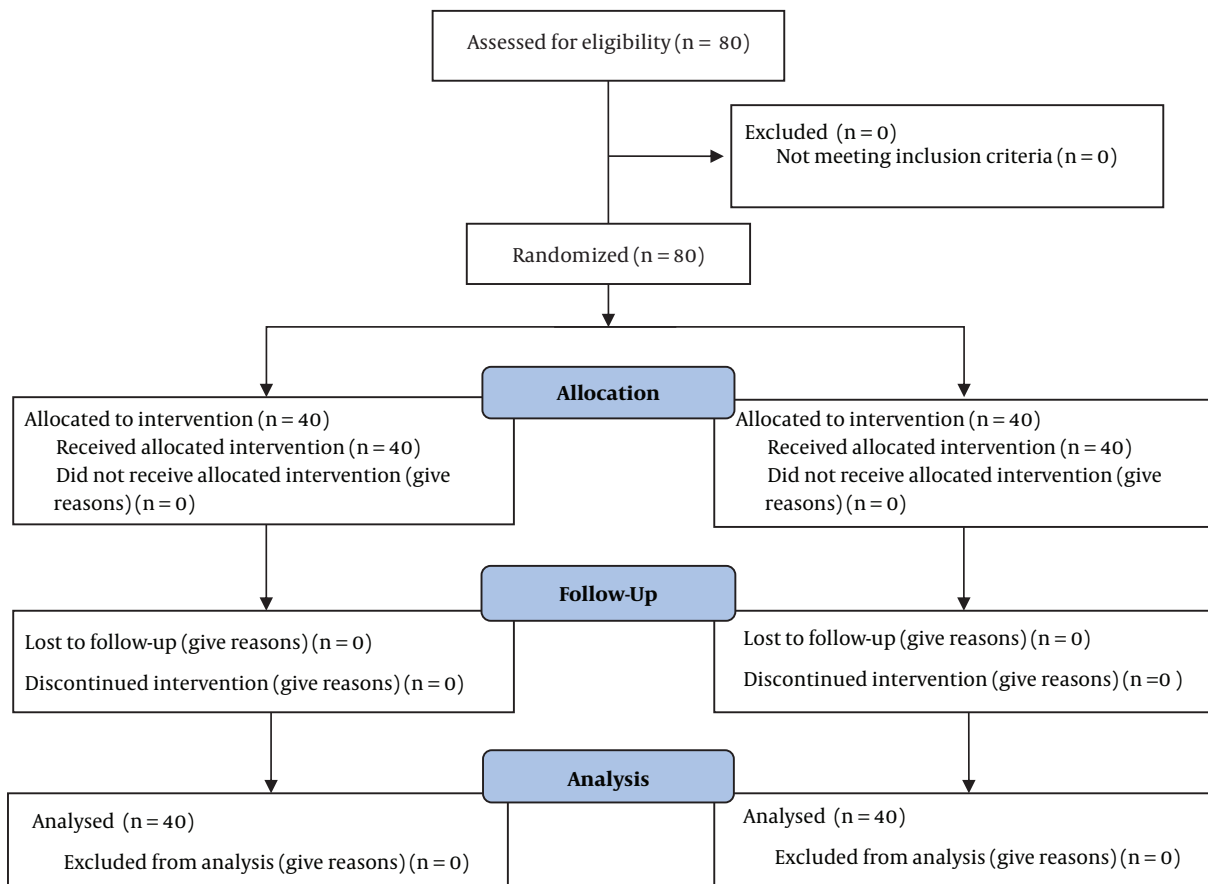


Figure 1. The process of the study according to the consort flow diagram

fore the intervention, a pretest was conducted to assess the severity of anxiety using the VAS-A tool, and the intervention was carried out immediately afterward.

The intervention was performed on the second day after the surgery because the patients on the first day of surgery were admitted to the intensive care unit and received a combination of narcotic and non-narcotic drugs, and they were often asleep. The intervention method was that the researcher poured four drops of *R. damascena* essential oil (Barij Essence Co., Iran, containing at least 8.5 mg of citronellol (active ingredient) per milliliter) plus 5 mL of normal saline 0.9% on the gauze (10 × 10) and then placed it inside a zipper plastic bag. The elderly in the case group inhaled inside the bags for one to two minutes. The control group inhaled bags containing only gauze impregnated with 5 mL distilled water. The elderly after opening the zipper kept the bags close to the nose (at a distance of one to two centimeters). Then, they began to breathe

deeply, as they inhaled with three numbers and exhaled with seven numbers. Exhaling into the bag helps to better smell the *R. damascena* essential oil (7, 14, 15). To prevent the psychological impact of the type of intervention on the results, the patients in the control group were told that there is a need for their cooperation to inhale a harmless substance for conducting research in the field of nursing care from patients undergoing knee replacement surgery. After the first intervention, subsequent interventions were performed three times with half an hour intervals, and the posttest was taken at the end of the fourth intervention; in other words, the whole intervention took place in two hours and four steps.

The “Ethical Committee” approval code is IR.IUMS.REC.1395.9411580004 and this clinical trial registered in the www.irct.ir with a code of (code: IRCT2017030832950N1).

4. Results

The results showed that the study elderly were homogeneous in terms of demographic variables in both case and control groups, except for two variables of education level and consumption of analgesics, which were also determined by two-way ANOVA. These parameters (education level, $P = 0.54$, and consumption of analgesics, $P = 0.661$) were not confounding variables (Table 1).

The results of the paired *t*-test in the case group indicated that the mean of anxiety in patients before and after the intervention was significantly different ($P < 0.001$). In the control group, the results of the paired *t*-test showed that there was no significant difference in the mean of anxiety in patients before and after the intervention ($P = 0.304$) (Table 2).

The comparison of the mean anxiety score in the control and case groups after the intervention showed no significant difference ($P = 0.345$). Consequently, for further examination and determining the effect of the intervention, the mean and standard deviation of the anxiety difference after the intervention and before the intervention in case and control groups were compared using an independent *t*-test. The results showed that the difference in the two groups was statistically significant and the anxiety reduction in the case group was more than in the control group ($P < 0.001$) (Table 3).

5. Discussion

This study aimed to investigate the effect of aromatherapy with *Rose damascena* on the severity of elderly anxiety after knee replacement surgery. The findings of this study showed inhalation aromatherapy with *Rose damascena* had a significant effect on reducing anxiety among the elderly patients, undergoing knee replacement surgery. Aromatherapy decreased the elderly anxiety after the intervention. These findings were in accordance with those of the previous studies (9-11).

Sahebzamani et al. (16) showed the combination of *Rose damascena* and *Lavandula angustifolia* reduced the anxiety and depression of female students living in dormitories. This study not only demonstrated the positive effect of aromatherapy but also stated the use of two fragrances together that could have a synergistic effect on the variables such as anxiety and depression.

It seems the aromatic molecules are bond to the olfactory receptors and transmit the neurological message to the limbic system in the brain. The limbic system is located

in a part responsible for stimulating neurotransmitter secretion, such as endorphin and enkephalins. These neurotransmitters create a sense of happiness and reduce the perception of pain and anxiety (8).

Also, Wotman et al. (17) found aromatherapy with lavender had a positive effect on reducing patient's anxiety before otolaryngology surgery. It seems lavender aroma, like *Rose damascena*, had a reducing effect on the patient's anxiety.

Aromatherapy in today's world with various plant extracts has many applications in health promotion. Aromatherapy with plant extracts such as bergamot, lavender, lemon, geranium can reduce pain, nausea, vomiting and improve sleep quality, etc. Furthermore, combining aromatherapy with other complementary medical methods such as massage therapy and music therapy can have a synergistic effect. In the study by Goli et al. (18) geranium aromatherapy and music, therapy reduced anxiety levels in the patients undergoing hernia surgery, and between aromatherapy and music therapy, aromatherapy had a better effect on reducing anxiety.

Also, Karsten et al. (19) showed aromatherapy with peppermint can significantly reduce nausea and vomiting after surgery. Hajibagheri et al. (20) found the patients with heart failure experienced improved quality of sleep after three nights of aromatherapy with *Rose damascena*. These results showed aromatherapy can affect other variables such as sleep quality, as well as psychological components.

This study is a non-randomized clinical trial. It is recommended further study should be performed as a randomized clinical trial. Since the ratio of male and female participants was not the same in this work, it is suggested that future studies be conducted as a gender based study. There were no side effects related to the use of Damask Rose in both case and control groups in this study.

5.1. Conclusions

According to the main objective of the research and the confirmation of the research hypothesis that "aromatherapy with *R. damascena* is effective in reducing the anxiety of elderly patients under knee joint surgery", it can be stated that aromatherapy is recommended as a non-pharmacological approach as well as complementary, low-cost, and easy-to-use medicine, even for home usage, to reduce anxiety in elderly patients under knee joint surgery. In addition, there were no side effects related to the use of Damask Rose aroma and placebo for the elderly patients in both case and control groups in this study.

Table 1. Percentage and Frequency Distribution of Demographic Variables and Their Significance Test^a

Variables	Case	Control	P-Value
Age	67.8 ± 5.6 (40)	67.9 ± 5.6 (40)	0.936
Sex			0.755
Male	7 (17.5)	5 (12.5)	
Female	33 (82.5)	35 (87.5)	
Level of education			< 0.001
Illiterate	20 (50)	5 (12.5)	
Reading and writing	19 (47.5)	23 (57.5)	
Diploma and higher	1 (2.5)	12 (30)	
Chronic disease	26 (65)	33 (82.5)	0.126
Economic situation			0.759
Good	7 (17.5)	10 (25)	
Average	23 (57.5)	20 (50)	
Poor	10 (25)	10 (25)	
Life style			0.622
Single	13 (32.5)	10 (25)	
With family	27 (67.5)	30 (75)	
Consumption of analgesics	7 (17.5)	22 (55)	< 0.001
History of hospitalization	36 (90)	36 (90)	0.99
History of surgery	33 (82.5)	33 (82.5)	0.99
Residence			0.087
City	32 (80)	38 (95)	
Village	8 (20)	2 (5)	
Smoking	0	5 (2)	0.494
Motor restriction	24 (60)	26 (65)	0.818
How to do activity			0.433
Independent	14 (35)	19 (47.5)	
Relatively dependent	25 (62.5)	19 (47.5)	
Completely dependent	1 (2.5)	2 (5)	
Caregiver during intervention	35 (87.5)	35 (87.5)	0.99
Insurance coverage	38 (95)	40 (100)	0.494
Marital status			0.99
Married	26 (65)	27 (67.5)	
Spouse	14 (35)	13 (32.5)	
Employment status			0.21
Homemaker	32 (80)	26 (65)	
Retiree	8 (20)	14 (35)	
Ethnicity			0.163
Turk	12 (30)	6 (15)	
Lur	3 (7.5)	5 (12.5)	
Fars	20 (50)	27 (67.5)	
Gilaki	3 (7.5)	0 (0)	
Kord	5 (2)	5 (5)	

^aValues are expressed as No. (%) or mean ± SD.

Table 2. Comparison of Mean and Standard Deviation of Elderly Anxiety in the Case and Control Groups Before and After the Intervention and its Significance Test

Step	Case Group, Mean \pm SD	Control Group, Mean \pm SD	Independent t-test Results
Before intervention	44.73 \pm 31.31	42.5 \pm 29.22	t = 0.33; df = 78; P = 0.742
After intervention	34.47 \pm 26.48	40.37 \pm 29.03	t = 0.95; df = 78; P = 0.345
Paired t-test results	t = 4.938; df = 39; P < 0.001	t = 1.041; df = 39; P = 0.304	

Table 3. Mean and Standard Deviation of the Difference in Anxiety Score Before and After the Intervention in the Case and Control Groups and Its Significance Test

Step	Case Group, Mean \pm SD	Control Group, Mean \pm SD	Independent t-test Results
Anxiety	10.26 \pm 13.14	2.12 \pm 12.9	t = 2.79; df = 78; P < 0.001

The limitation of this study was the semi-experimental and non-randomized assignment of the subjects to the two groups that weakened the generalizability of the outcomes. Moreover, the study was limited to two hospitals; hence, it increased somewhat the internal validity of the study but reduced the generalizability of the results.

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Footnotes

Authors' Contribution: Study concept and design: Farideh Bastani. Analysis and interpretation of data: Hamid Haghani; drafting the manuscript: Parvaneh Samady Kia.

Clinical Trial Registration Code: The clinical trial registration code was IRCT2017030832950N1.

Conflict of Interests: There are no conflicts of interests.

Ethical Approval: The ethical approval code was IR.IUMS.REC.1395.9411580004.

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Informed Consent: Written informed consent was obtained from the studied elderly patients to complete the demographic information form through the records and interviews.

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